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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,491	03/31/2001	James W. Edwards	042390P10503	6546

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EXAMINER

PYZOCHA, MICHAEL J

ART UNIT	PAPER NUMBER
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2137

DATE MAILED: 07/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/823,491

Applicant(s)

EDWARDS ET AL.

Examiner

Michael Pyzocha

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2005.  
2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5, 12-14, 23-25 and 34-36 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-5, 12-14, 23-25 and 34-36 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

1. Claims 1-5, 12-14, 23-25 and 34-36 are pending.
2. Amendment filed 04/12/2005 has been received and considered as a request for continued examination.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 12, 23, 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cowan et al (with updates to StackGuard 1.1 on 08 January 2000) and further in view of Koopman.

As per claims 1, 12, 23, and 34, Cowan et al discloses placing a return address on a stack (see page 7); adding a plurality of empty spaces to a known place on the stack (see StackGuard 1.1 page 4 the null canary); executing a called function (see pages 5-6); find the return address (see page 7).

Cowan et al fails to disclose removing one or more of the plurality of empty spaces from the known place on the stack

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where they were previously placed to find the address and setting an end of stack pointer to an end of stack frame.

However, Koopman teaches these removing items from a stack to get to the next piece of data and pointers for the top of the stack (see pages 1-2).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use Koppman's method of removing data from a stack to remove the random space of Cowen et al.

Motivation to do so would have been to prevent the stack from overflowing (see Koopman Figure 1.1 where after 9 is pushed onto the stack if it is not removed the stack will overflow).

5. Claims 2-4, 13-14, 24-25, 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over the modified Cowen et al and Koopman system as applied to claims 1, 12, 23 and 34 above, and further in view of Kettlewell (webpage).

As per claims 2, 13, 24 and 35, the modified Cowen et al and Koopman system discloses calculating a random number (see Cowen et al page 9); and setting an end of stack pointer to an end of the stack frame (see Koopman page 2 section 1.2.2 paragraph 1) building a stack frame by placing values from the called function onto the stack (see Cowen et al figure 2).

The modified Cowen et al and Koopman system fails to disclose saving said random number in a secure location; placing a plurality of blank bytes equal to the random number onto the stack.

However Kettlewell teaches saving said random number in a secure location; placing a plurality of blank bytes equal to the random number onto the stack (Kettlewell page 3);

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use Kettlewell's method of saving said random number in a secure location; placing a plurality of blank bytes equal to the random number onto the stack in the modified system of Cowen et al and Koopman.

Motivation to do so would have been to deny an attack of knowing where the target address is at (see Kettlewell page 3)

As per claims 3, 14, 25 and 36, the modified Cowen et al, Koopman and Kettlewell system discloses the secure location being a register not generally accessible (see Cowan et al figure 3)

As per claim 4, the modified Cowen et al, Koopman and Kettlewell system discloses the modified return routine comprises: recalling a random number saved during an execution of said modified call routine (see Cowan et al figure 4 line 1 where the canary is the random space of Kettlewell); removing a

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number of bytes equal to said random number from the stack (see Cowan et al figure 4 line 3); retrieving a return address for the called function from the stack (see Cowan et al page 7 first paragraph); and setting an end of stack pointer to an end of a previous stack frame (see Koopman page 2, 1.2.2 paragraph 1).

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the modified Cowen et al and Koopman system as applied to claim 1 above, and further in view of Menezes et al (Handbook of Applied Cryptography).

As per claim 5, the modified Cowen et al and Koopman system discloses building a stack frame by placing values from the called function onto the stack (see Cowan et al figure 2).

The modified Cowen et al, Koopman and Kettlewell system fails to disclose calculating a hash value and storing a hash value of the stack invariants.

However, Menezes et al teaches the use of hash values for message integrity (see page 323 and it is inherent that the hash must be done on invariants and that it must be stored in order to check the integrity).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use Menezes et al's hash function in the modified Cowen et al, Koopman and

Kettlewell system. Motivation to do so would have been to provide content integrity (see Menezes et al page 323).

### ***Response to Arguments***

7. Applicant's arguments filed 4/12/2005 have been fully considered but they are not persuasive. Applicant argues that Cowan in view of Koopman fail to disclose removing the empty spaces from the known place on the stack where they were previously placed to find the return address. Regarding this argument, Cowan places (pushes) the empty spaces on a known place on the stack, which is right after the return address as see on page 4. Koopman teaches LIFO (last in first out) to remove (pop) items off of a stack as seen on pages 1-2. When Koopman is applied to Cowan, the empty spaces are removed (as taught by Koopman) from the known place next to the return address where they were originally placed (as taught by Cowan where the known place is right after the return address).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Pyzocha whose telephone number is (571) 272-3875. The examiner

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can normally be reached on 7:00am - 4:30pm first Fridays of the bi-week off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emmanuel Moise can be reached on (571) 272-3865. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJP

*Matthew Smithers*  
MATTHEW SMITHERS  
PRIMARY EXAMINER  
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